



## **ENVIRONMENTAL PROTECTION AGENCY**

**[FRL-9951-82-OAR]**

### **Alternative Method for Calculating Off-cycle Credits under the Light-duty Vehicle Greenhouse Gas Emissions Program: Applications from BMW Group, Ford Motor Company, General Motors Corporation, and Volkswagen Group of America**

**AGENCY:** Environmental Protection Agency (EPA).

**ACTION:** Notice.

**SUMMARY:** The Environmental Protection Agency (EPA) is requesting comment on applications from BMW of North American (BMW), Ford Motor Company (Ford), General Motors Corporation (GM), and Volkswagen Group of America (VW) for off-cycle carbon dioxide (CO<sub>2</sub>) credits under EPA's light-duty vehicle greenhouse gas emissions standards. "Off-cycle" emission reductions can be achieved by employing technologies that result in real-world benefits, but where that benefit is not adequately captured on the test procedures used by manufacturers to demonstrate compliance with emission standards. EPA's light-duty vehicle greenhouse gas program acknowledges these benefits by giving automobile manufacturers several options for generating "off-cycle" carbon dioxide (CO<sub>2</sub>) credits. Under the regulations, a manufacturer may apply for CO<sub>2</sub> credits for off-cycle technologies that result in off-cycle benefits. In these cases, a manufacturer must provide EPA with a proposed methodology for determining the real-world off-cycle benefit. These four manufacturers have submitted applications that describe methodologies for determining off-cycle credits. The off-cycle technologies vary by manufacturer and include active aerodynamics systems, active cabin ventilation, active seat ventilation, solar reflective glass/glazing, solar reflective surface coating

(paint), active engine warmup, active transmission warmup, engine idle stop-start systems, and high efficiency lighting. Pursuant to applicable regulations, EPA is making descriptions of each manufacturer's off-cycle credit calculation methodologies available for public comment.

**DATES:** Comments must be received on or before [insert date 30 days after publication in the Federal Register].

**ADDRESSES:** Submit your comments, identified by Docket ID No. EPA-HQ- OAR-2016-0503, to the Federal eRulemaking Portal: <http://www.regulations.gov>. Follow the online instructions for submitting comments. Once submitted, comments cannot be edited or withdrawn. The EPA may publish any comment received to its public docket. Do not submit electronically any information you consider to be Confidential Business Information (CBI) or other information whose disclosure is restricted by statute. Multimedia submissions (audio, video, etc.) must be accompanied by a written comment. The written comment is considered the official comment and should include discussion of all points you wish to make. The EPA will generally not consider comments or comment contents located outside of the primary submission (i.e. on the web, cloud, or other file sharing system). For additional submission methods, the full EPA public comment policy, information about CBI or multimedia submissions, and general guidance on making effective comments, please visit <http://www2.epa.gov/dockets/commenting-epa-dockets>.

**FOR FURTHER INFORMATION CONTACT:** Roberts French, Environmental Protection Specialist, Office of Transportation and Air Quality, Compliance Division, U.S. Environmental Protection Agency, 2000 Traverwood Drive, Ann Arbor, MI 48105. Telephone: (734) 214-4380. Fax: (734) 214-4869. Email address: [french.roberts@epa.gov](mailto:french.roberts@epa.gov).

**SUPPLEMENTARY INFORMATION:**

## **I. Background**

EPA's light-duty vehicle greenhouse gas (GHG) program provides three pathways by which a manufacturer may accrue off-cycle carbon dioxide (CO<sub>2</sub>) credits for those technologies that achieve CO<sub>2</sub> reductions in the real world but where those reductions are not adequately captured on the test used to determine compliance with the CO<sub>2</sub> standards, and which are not otherwise reflected in the standards' stringency. The first pathway is a predetermined list of credit values for specific off-cycle technologies that may be used beginning in model year 2014.<sup>1</sup> This pathway allows manufacturers to use conservative credit values established by EPA for a wide range of technologies, with minimal data submittal or testing requirements, as long as the technologies meet EPA regulatory definitions. In cases where the off-cycle technology is not on the menu but additional laboratory testing can demonstrate emission benefits, a second pathway allows manufacturers to use a broader array of emission tests (known as "5-cycle" testing because the methodology uses five different testing procedures) to demonstrate and justify off-cycle CO<sub>2</sub> credits.<sup>2</sup> The additional emission tests allow emission benefits to be demonstrated over some elements of real-world driving not adequately captured by the GHG compliance tests, including high speeds, hard accelerations, and cold temperatures. These first two methodologies were completely defined through notice and comment rulemaking and therefore no additional process is necessary for manufacturers to use these methods. The third and last pathway allows manufacturers to seek EPA approval to use an alternative methodology for determining the off-cycle CO<sub>2</sub> credits.<sup>3</sup> This option is only available if the benefit of the technology cannot be adequately demonstrated using the 5-cycle methodology. Manufacturers may also use this option for model years prior to 2014 to demonstrate off-cycle CO<sub>2</sub> reductions for technologies that are

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<sup>1</sup> See 40 CFR 86.1869-12(b).

<sup>2</sup> See 40 CFR 86.1869-12(c).

<sup>3</sup> See 40 CFR 86.1869-12(d).

on the predetermined list, or to demonstrate reductions that exceed those available via use of the predetermined list.

Under the regulations, a manufacturer seeking to demonstrate off-cycle credits with an alternative methodology (i.e., under the third pathway described above) must describe a methodology that meets the following criteria:

- Use modeling, on-road testing, on-road data collection, or other approved analytical or engineering methods;
- Be robust, verifiable, and capable of demonstrating the real-world emissions benefit with strong statistical significance;
- Result in a demonstration of baseline and controlled emissions over a wide range of driving conditions and number of vehicles such that issues of data uncertainty are minimized;
- Result in data on a model type basis unless the manufacturer demonstrates that another basis is appropriate and adequate.

Further, the regulations specify the following requirements regarding an application for off-cycle CO<sub>2</sub> credits:

- A manufacturer requesting off-cycle credits must develop a methodology for demonstrating and determining the benefit of the off-cycle technology, and carry out any necessary testing and analysis required to support that methodology.
- A manufacturer requesting off-cycle credits must conduct testing and/or prepare engineering analyses that demonstrate the in-use durability of the technology for the full useful life of the vehicle.

- The application must contain a detailed description of the off-cycle technology and how it functions to reduce CO<sub>2</sub> emissions under conditions not represented on the compliance tests.
- The application must contain a list of the vehicle model(s) which will be equipped with the technology.
- The application must contain a detailed description of the test vehicles selected and an engineering analysis that supports the selection of those vehicles for testing.
- The application must contain all testing and/or simulation data required under the regulations, plus any other data the manufacturer has considered in the analysis.

Finally, the alternative methodology must be approved by EPA prior to the manufacturer using it to generate credits. As part of the review process defined by regulation, the alternative methodology submitted to EPA for consideration must be made available for public comment.<sup>4</sup> EPA will consider public comments as part of its final decision to approve or deny the request for off-cycle credits.

## **II. Off-Cycle Credit Applications**

### *A. BMW of North America*

Using the alternative methodology approach discussed above, BMW of North America (BMW) is applying for credits for model years prior to 2014, and thus prior to when the list of default credits became available. BMW has applied for off-cycle credits using the alternative demonstration methodology pathway for the following technologies: high efficiency exterior

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<sup>4</sup> See 40 CFR 86.1869-12(d)(2).

lighting, solar reflective glass/glazing, active seat ventilation, active cabin ventilation, and active engine warmup. With the exception of active cabin ventilation, EPA has already approved credits for these technologies for model years prior to 2014.<sup>5</sup> BMW's request is consistent with previously approved methodologies and credits. The application covers 2009-2013 model year vehicles. All of these technologies are described in the predetermined list of credits available in the 2014 and later model years. The methodologies described by BMW are consistent with those used by EPA to establish the predetermined list of credits in the regulations, and would result in the same credit values as described in the regulations. The magnitude of these credits is determined by specification or calculations in the regulations based on vehicle-specific measurements (e.g., the area of glass or the lighting locations using the specified technologies), but would be no higher than the following established regulatory values:

<b>Technology</b>	<b>Off-Cycle Credit – Cars (grams/mile)</b>	<b>Off-Cycle Credit – Trucks (grams/mile)</b>
High efficiency lighting	1.0	1.0
Solar reflective glass/glazing	2.9	3.9
Active seat ventilation	1.0	1.3
Active cabin ventilation	2.1	2.8
Active engine warmup	1.5	3.2

#### *B. Ford Motor Company*

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<sup>5</sup> “EPA Decision Document: Off-cycle Credits for Fiat Chrysler Automobiles, Ford Motor Company, and General Motors Corporation.” Compliance Division, Office of Transportation and Air Quality, U.S. Environmental Protection Agency. EPA-420-R-15-014, September 2015.

Using the alternative methodology approach discussed above, Ford Motor Company (Ford) is applying for credits for model years prior to 2014, and thus prior to when the list of default credits became available. Ford has applied for off-cycle credits using the alternative demonstration methodology pathway for the following technologies: high efficiency exterior lighting, active seat ventilation, active aerodynamics, active transmission warmup, active engine warmup, and engine idle stop-start systems. EPA has already approved credits for these technologies for the 2012 and 2013 model years for Ford, and for some of these technologies for Fiat Chrysler for the 2009-2013 model years.<sup>6</sup> Ford's request is consistent with previously approved methodologies and credits. The application covers the 2009-2011 model year vehicles, model years which were inadvertently omitted from Ford's previous request. All of these technologies are described in the predetermined list of credits available in the 2014 and later model years. The methodologies described by Ford are consistent with those used by EPA to establish the predetermined list of credits in the regulations, and would result in the same credit values as described in the regulations. The magnitude of these credits is determined by specification or calculations in the regulations based on vehicle-specific measurements (e.g., the area of glass or the lighting locations using the specified technologies), but would be no higher than the following established regulatory values:

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<sup>6</sup> "EPA Decision Document: Off-cycle Credits for Fiat Chrysler Automobiles, Ford Motor Company, and General Motors Corporation." Compliance Division, Office of Transportation and Air Quality, U.S. Environmental Protection Agency. EPA-420-R-15-014, September 2015.

<b>Technology</b>	<b>Off-Cycle Credit – Cars (grams/mile)</b>	<b>Off-Cycle Credit – Trucks (grams/mile)</b>
High efficiency lighting	1.0	1.0
Active seat ventilation	1.0	1.3
Active aerodynamics	Based on measured reduction in the coefficient of drag.	
Active transmission warm-up	1.5	3.2
Active engine warm-up	1.5	3.2
Engine idle start-stop	2.5	4.4

### *C. General Motors Corporation*

Using the alternative methodology approach discussed above, General Motors Corporation (GM) is applying for credits for model years prior to 2014, and thus prior to when the list of default credits became available. GM has applied for off-cycle credits using the alternative demonstration methodology pathway for the following technologies: high efficiency exterior lighting, solar reflective glass/glazing, solar reflective paint, active seat ventilation, active aerodynamics, active engine warmup, and engine idle stop-start systems. EPA has already approved credits for these technologies for model years prior to 2014.<sup>7</sup> GM's request is consistent with previously approved methodologies and credits. The application covers the 2009-2013 model year vehicles. All of these technologies are described in the predetermined list of credits available in the 2014 and later model years. The methodologies described by GM are

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<sup>7</sup> "EPA Decision Document: Off-cycle Credits for Fiat Chrysler Automobiles, Ford Motor Company, and General Motors Corporation." Compliance Division, Office of Transportation and Air Quality, U.S. Environmental Protection Agency. EPA-420-R-15-014, September 2015.



consistent with those used by EPA to establish the predetermined list of credits in the regulations, and would result in the same credit values as described in the regulations. The magnitude of these credits is determined by specification or calculations in the regulations based on vehicle-specific measurements (e.g., the area of glass or the lighting locations using the specified technologies), but would be no higher than the following established regulatory values:

<b>Technology</b>	<b>Off-Cycle Credit – Cars (grams/mile)</b>	<b>Off-Cycle Credit – Trucks (grams/mile)</b>
High efficiency lighting	1.0	1.0
Solar reflective glass/glazing	2.9	3.9
Solar reflective paint	0.4	0.5
Active seat ventilation	1.0	1.3
Active aerodynamics	Based on measured reduction in the coefficient of drag	
Active engine warm-up	1.5	3.2
Engine idle start-stop	2.5	4.4

#### *D. Volkswagen of America*

Using the alternative methodology approach discussed above, Volkswagen of America (VW) is applying for credits for model years prior to 2014, and thus prior to when the list of default credits became available. VW has applied for off-cycle credits using the alternative demonstration methodology pathway for the following technologies: active aerodynamics systems, active seat ventilation, solar reflective glass/glazing, solar reflective surface coating

(paint), active engine warmup, active transmission warmup, engine idle stop-start systems, and high efficiency lighting. EPA has already approved credits for these technologies for model years prior to 2014.<sup>8</sup> VW's request is consistent with previously approved methodologies and credits. The application covers the 2012-2013 model year vehicles. All of these technologies are described in the predetermined list of credits available in the 2014 and later model years. The methodologies described by VW are consistent with those used by EPA to establish the predetermined list of credits in the regulations, and would result in the same credit values as described in the regulations. The magnitude of these credits is determined by specification or calculations in the regulations based on vehicle-specific measurements (e.g., the area of glass or the lighting locations using the specified technologies), but would be no higher than the following established regulatory values:

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<sup>8</sup> "EPA Decision Document: Off-cycle Credits for Fiat Chrysler Automobiles, Ford Motor Company, and General Motors Corporation." Compliance Division, Office of Transportation and Air Quality, U.S. Environmental Protection Agency. EPA-420-R-15-014, September 2015.

<b>Technology</b>	<b>Off-Cycle Credit – Cars (grams/mile)</b>	<b>Off-Cycle Credit – Trucks (grams/mile)</b>
High efficiency lighting	1.0	1.0
Solar reflective glass/glazing	2.9	3.9
Solar reflective paint	0.4	0.5
Active seat ventilation	1.0	1.3
Active aerodynamics	Based on measured reduction in the coefficient of drag.	
Active engine warm-up	1.5	3.2
Active transmission warm- up	1.5	3.2
Engine idle start-stop	2.5	4.4

### **III. EPA Decision Process**

EPA has reviewed the applications for completeness and is now making the applications available for public review and comment as required by the regulations. The off-cycle credit applications submitted by BMW, Ford, GM, and VW (with confidential business information redacted) have been placed in the public docket (see ADDRESSES section above) and on EPA's web site at <http://www.epa.gov/otaq/regs/ld-hwy/greenhouse/ld-ghg.htm>. EPA is providing a 30-day comment period on the applications for off-cycle credits described in this notice, as specified by the regulations. The manufacturers may submit a written rebuttal of comments for EPA's consideration, or may revise an application in response to comments. After reviewing any

public comments and any rebuttal of comments submitted by manufacturers, EPA will make a final decision regarding the credit requests. EPA will make its decision available to the public by placing a decision document (or multiple decision documents) in the docket and on EPA's web site at <http://www.epa.gov/otaq/regs/ld-hwy/greenhouse/ld-ghg.htm>. While the broad methodologies used by these manufacturers could potentially be used for other vehicles and by other manufacturers, the vehicle specific data needed to demonstrate the off-cycle emissions reductions would likely be different. In such cases, a new application would be required, including an opportunity for public comment.

Dated: August 26, 2016.

**Byron J. Bunker**  
**Director, Compliance Division**  
*Office of Transportation and Air Quality*  
*Office of Air and Radiation.*

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